

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	South Sound Net Pen Coho Program
Species or Hatchery Stock:	Coho (<i>Onchorynchus kisutch</i>) Minter Creek
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Peale Pass Puget Sound
Date Submitted:	March 17, 2003
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SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

South Sound Net Pen Coho Program

1.2) Species and population (or stock) under propagation, and ESA status.

Minter Creek and Wallace River Coho (*Onchorynchus kisutch*) - not listed

1.3) Responsible organization and individuals

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

This program is cooperatively operated with staff from the Squaxin Island Tribe. WDFW contracts labor services to them for care of the coho while they are reared at the net pens. We work cooperatively with their staff to develop rearing plans, implement appropriate release strategies and monitor fish health. Fish feed is purchased by the state and provided to the tribe for the program.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

This program is funded through the state general fund and is cooperatively managed with various staff from the Squaxin Island Tribe and South Sound Complex.

These costs are the only budgeted items for this project; state staff hours, trucking and other maintenance costs are absorbed into the larger Complex budget mainly through Tumwater Falls.

Operational costs include:

Contracted Labor Costs:	\$130,000.00
Feed Costs:	\$65,000.00

1.5) Location(s) of hatchery and associated facilities.

The South Sound and Squaxin Island Net Pens are located in Peale Passage, South Puget Sound.

The legal description of the land is:

Beginning at the section corner common to Sections 22,23,26,27, Township 20 North, Range 2 West, Willamette Meridian; thence North 29 51' East a distance of 891.45 feet to the true point of beginning; thence North 29 00' East a distance of 800 feet; thence South 0 00' East a distance of 800 feet; thence North 90 00' West a distance of 350 feet; thence South 0 00' East a distance of 600 feet; thence North 90 00' West a distance of 450 feet; thence North 0 00' East a distance of 1400 feet to the true point of beginning.

Skookumchuck Rearing Facility: 10500 Skookumchuck RD SE Tenino, Wa. 98589
Located 0.5 miles below Skookumchuck Dam on the Skookumchuck river. Tributary to the Chehalis River

Wallace River Hatchery: 14418 383rd Av. SE, Sultan, WA 98294. Located on Wallace River (07.0940) at RM 4, tributary to the Skykomish River (07.0963)

Minter Creek Hatchery: Located on Minter Creek (15.0048), tributary to Carr Inlet in Puget Sound.

1.6) Type of program.

Isolated harvest

1.7) Purpose (Goal) of program.

Augmentation.

The goal of this program is to provide adult fish for harvest opportunity.

1.8) Justification for the program.

This program would be considered an Isolated Harvest. It supplies coho salmon for harvest in the Strait of Juan de Fuca and Puget Sound recreational fisheries. It also provides coho salmon for harvest in tribal fishery. Harvest impacts to listed fish are minimized in the following manner:

1. All fish are 100% adipose fin clipped which allows for release of fish with adipose fins

in selective recreational fisheries.

2. Tribal harvesters use beach seines exclusively. This type of gear captures fish alive and allows for fish to be processed immediately. Selective fishing is possible with this gear, unlike gillnets. Tribal fisheries are considering adopting selective fishing regulations in 2001.

3. Tribal fisheries are structured to fish in and around the release site of the coho (Peale Passage), exclusion zones are set up 1,000 feet from the entrance to the six inlets that may support naturally produced coho runs.

4. The tribal coho fishery occurs during a time period when listed chinook stocks would not be present.

1.9) List of program “Performance Standards”.

See below

1.10) List of program “Performance Indicators”, designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Coho programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and cwt data
Meet hatchery production goals	Number of juvenile fish released - 1,800,000	Future Brood Document (FBD) and hatchery records
Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records
Minimize interactions with listed fish through proper broodstock management and mass marking.	Number of broodstock collected - NA	Rack counts and CWT data

broodstock management and mass marking.

Maximize hatchery adult capture effectiveness.

Use only hatchery fish

Spawning guidelines

Hatchery records

Spawning guidelines

Hatchery records

	Stray Rates	
	Sex ratios	
	Age structure	
	Timing of adult collection/spawning - NA	
	Adherence to spawning guidelines - NA	
	Total number of wild adults passed upstream - NA	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Out-migration timing of listed fish / hatchery fish / May-June	FBD and historic natural outmigration times
	Size and time of release - 10 fpp released May/June	FBD and hatchery records
	Hatchery stray rates	CWT data, mark/unmark ratios
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	
Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy
	Fish pathologists will diagnose fish health problems and minimize their impact	Fish Health Monitoring Records

	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES reports

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

No broodstock collected

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. *(Use standardized life stage definitions by species presented in Attachment 2).*

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Peale Pass	*1,800,000

*- Since the 1995 BY, the program has reduced its release numbers from 2,200,000 to the present 1,800,000.

1.12) Current program performance, including estimated smolt-to-adult survival rates,

adult production levels, and escapement levels. Indicate the source of these data.

Between broodyears 1988-1997, the average smolt-to-adult survival rate was 2.73%

1.13) Date program started (years in operation), or is expected to start.

Location	First Coho Release	Years in Operation
South Sound Net Pens	1984	17
Squaxin Island Net Pens	1971	30

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

These fish are intended to contribute to Puget Sound sport and net fisheries.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

NA

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

None.

- Identify the ESA-listed population(s) that may be incidentally affected by the program.

Puget Sound Chinook:

Nisqually Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history,

survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other South Puget Sound fall chinook populations (Puyallup River and Green River fall chinook). Adults are presumed to be predominantly 4-year-olds at return (likely 60-80%), with smaller components of 2-year-olds (<10%), 3-year-olds (10-20%), 5-year-olds (5-10%) and 6-year-olds (<1%). Size at age is expected to be similar to the data listed below for Puyallup and Green River fall chinook.

Chinook spawning habitat in the mainstem Nisqually River is available from river mile 3 to just above the mouth of the Mashel River (approximately river mile 40). Chinook have been documented spawning in the accessible reaches of the Mashel River and Ohop Creek. There is occasional chinook utilization of 25 Mile Creek, a tributary to Ohop Lake.

River entry of mature adults begins in July and extends through September. Spawning occurs from early September through October. Most Nisqually River fall chinook juveniles likely migrate to salt water as zero age smolts after only a few months of freshwater residence. If migration timing is similar to Green River stock, the outmigration likely peaks in May. After several weeks of estuarine acclimation and feeding, the juveniles move off to feeding grounds in Puget Sound and the Pacific Ocean.

South Sound Tributary Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other south Puget Sound fall chinook populations (Puyallup River and Green River fall chinook), since it is thought to be dependent on ongoing hatchery production (strays) in south Puget Sound. SASSI defines this stock as naturally spawning chinook in a number of widely distributed rivers, including McAllister Creek, Grovers Creek, Gorst Creek, Chambers Creek, Carr Inlet tributaries, the Deschutes River and other small streams in south Puget Sound.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds (*see definitions in “Attachment 1”*).

Critical and viable population thresholds under ESA have not been determined, however, the SASSI report (1992) determined that status of the South Sound Tributary Summer/Fall Chinook and Nisqually Summer/Fall Chinook stocks are "healthy".

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Nisqually River fall chinook - Unknown.

South Sound Tributaries fall chinook - Unknown

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Estimates of fall chinook spawning naturally in the Nisqually River:

<u>Year</u>	<u>Spawning number</u>
1988	1342
1989	2332
1990	994
1991	953
1992	106
1993	1655
1994	1730
1995	817
1996	606
1997	340
1998	834
1999	1399

Estimates of fall chinook spawning naturally in South Sound Tributaries:

<u>Year</u>	<u>Spawning numbers</u>
1988	4257
1989	4979
1990	15814
1991	3681
1992	3610
1993	2998
1994	4950
1995	7456
1996	14931
1997	4192
1998	6372
1999	11028

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Nisqually River fall chinook - Unknown. There are inadequate spawning ground sampling data to estimate proportions.

South Sound Tributaries fall chinook - Unknown, although SASSI states that stock status

is dependent upon local hatchery production.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take (see "Attachment 1" for definition of "take").

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

The release of fish as described in this HGMP could potentially result in ecological interactions with listed species. These potential ecological interactions are discussed in Section 3.5, and risk control measures are discussed in Section 10.11. Implementation of the program modifications provided in this HGMP, and the actions previously taken by the comanagers, are anticipated to contribute to the continued improvement in the abundance of listed salmonids.

The net pen program does not collect broodstock. It only raises and releases coho already received from other stations. The broodstock collection for these fish occurs at Minter Creek and Wallace River. Please see their individual HGMP's for further information.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Unknown

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Complete the appended "take table" (Table 1) for this purpose. Provide a range of potential take numbers to account for alternate or "worst case" scenarios.

See "take" table.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

NA

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

This program's operation is consistent with the Puget Sound Salmon Management Plan.

3.3) Relationship to harvest objectives.

Harvest impacts to listed fish are minimized in the following manner:

1. All fish are 100% adipose fin clipped which allows for release of fish with adipose fins in selective recreational fisheries.

2. Tribal harvesters use beach seines exclusively. This type of gear captures fish alive and allows for fish to be processed immediately. Selective fishing is possible with this gear, unlike gillnets. Tribal fisheries are considering adopting selective fishing regulations in 2001.

3. Tribal fisheries are structured to fish in and around the release site of the coho (Peale Passage), exclusion zones are set up 1,000 feet from the entrance to the six inlets that may support naturally produced coho runs.

4. The tribal coho fishery occurs during a time period when listed chinook stocks would not be present.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The following mean contribution rates, by fishery, are for the yearling release at 10 fpp and are based on 26 coded-wire-tagged releases of 1988 through 1996 brood production.

South Sound Net Pen coho yearling releases:

Fishery	Mean Contribution Rate (Catch/yearling released)
Alaskan Fisheries	0.00000
Canadian Fisheries	0.00499
Oregon Fisheries	0.00053
WA Treaty Troll	0.00030
WA Non-treaty Troll	0.00024
WA Coastal Net	0.00004

WA Ocean Sport	0.00067
PS Net	0.01755
PS Sport	0.00930
Freshwater Sport	0.00000
 Total Fishery Contribution	 0.03362

This mean contribution rate would estimate a total fishery contribution of 60,516 fish from the current programmed release of 1,800,000 yearlings. Note that these mean contribution rates may not be representative of current expectations, since the coded-wire-tagging was done during a period that witnessed generally higher marine survivals than recent coho survival. Harvest rates are not a meaningful statistic for net pen releases, due to incomplete escapement information.

3.4) Relationship to habitat protection and recovery strategies.

The comanagers' resource management plans for artificial production in Puget Sound are expected to be one component of a recovery plan for Puget Sound chinook under development through the Shared Strategy process. Several important analyses have been completed, including the identification of populations of Puget Sound chinook, but further development of the plan may result in an improved understanding of the habitat, harvest, and hatchery actions required for recovery of Puget Sound chinook.

3.5) Ecological interactions.

The program described in this HGMP interacts with the biotic and abiotic components of the freshwater, estuarine, and marine salmonid ecosystem through a complex web of short and longterm processes. The complexity of this web means that secondary or tertiary interactions (both positive and negative) with listed species could occur in multiple time periods, and that evaluation of the net effect can be difficult. WDFW is not aware of any studies that have directly evaluated the ecological effects of this program. Alternatively, we provide in this section a brief summary of empirical information and theoretical analyses of three types of ecological interactions, nutrient enhancement, predation, and competition, that may be relevant to this program. Recent reviews by Fresh (1997), Flagg et al. (2000), and Stockner (2003) can be consulted for additional information; NMFS (2002) provides an extensive review and application to ESA permitting of artificial production programs.

Nutrient Enhancement

Adults originating from this program that return to natural spawning areas may provide a source of nutrients in oligotrophic coastal river systems and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmon have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity

(Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003).

Predation – Freshwater Environment

Release of fish from pens directly into marine waters minimizes the likelihood of predation occurring in the freshwater environment.

Predation – Marine Environment

WDFW is unaware of any studies that have empirically estimated the predation risks to listed species posed by the program described in this HGMP. NMFS (2002) reviewed existing information on the risks of predation in the marine environment posed by artificial production programs and concluded:

“1) Predation by hatchery fish on natural-origin smolts or sub-adults is less likely to occur than predation on fry. Coho and chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish prey that is less than one-fifth of their length (Brodeur 1991). During early marine life, predation on natural origin chinook, coho, and steelhead will likely be highest in situations where large, yearling-sized hatchery fish encounter sub-yearling fish or fry (SIWG 1984).”

“2) However, extensive stomach content analysis of coho salmon smolts collected through several studies in marine waters of Puget Sound, Washington do not substantiate any indication of significant predation upon juvenile salmonids (Simestad and Kinney 1978).”

“3) Likely reasons for apparent low predation rates on salmon juveniles, including chinook, by larger chinook and other marine predators are described by Cardwell and Fresh (1979). These reasons included: 1) due to rapid growth, fry are better able to elude predators and are accessible to a smaller proportion of predators due to size alone; 2) because fry have dispersed, they are present in low densities relative to other fish and invertebrate prey; and 3) there has either been learning or selection for some predator avoidance.”

Competition

WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) NMFS (2002) noted that “..where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences

exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates.”

2) Flagg et al. (2000) concluded, “By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids.” Flagg et al (2000) also stated “It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment.”

3) Fresh (1997) noted that “Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results.”

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Skookumchuck Hatchery: Approximately 20 cubic feet per second (cfs) of water is supplied to two ½ acre asphalt ponds and one 8' X 80' X 3' raceway by gravity flow from the Skookumchuck Reservoir. Water temperature can be regulated (40-56°F) by three intake levels in the reservoir. This facility operates under an NPDES permit # WAG-13-1042.

Peale Pass: Net pens sited in saltwater between Squaxin and Hartstene Islands. This facility has applied for an NPDES permit (April 2001).

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Skookumchuck: The watershed is not in the ESU and has no direct link or contact with the listed species.

Net Pens: Water is passively used by current flow through the pens. There is no known impact to listed fish from this program.

SECTION 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see “Guidelines for Providing Responses” Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

5.1) Broodstock collection facilities (or methods).

No broodstock collection at this facility. Refer to Minter Creek coho and Wallace River coho HGMP's.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Fish are transferred from Marblemount Hatchery to Skookumchuck using diesel tank trucks with water volumes between 1,000 and 1,800 gallons. Fish poundage hauled is capped at 0.5 pounds (lbs) of fish per gallon of water (fish 400 fish per pound (fpp) transfer to Skookumchuck) and 1.0 lbs. of fish per gallon of water (fish transferred from Skookumchuck or Wallace to net pens @ 22 fpp).

All trucks use oxygen and recirculating pumps to maintain a healthy hauling environment. Salt is used for transport to reduce stress on fish.

5.3) Broodstock holding and spawning facilities.

See section 5.1

5.4) Incubation facilities.

No incubation takes place at these facilities. Refer to Minter Creek and Wallace River coho HGMP's.

5.5) Rearing facilities.

At the Skookumchuck facility located on the Skookumchuck River just below the Skookumchuck Dam there are two 0.85 acre asphalt ponds and one 8' X 80' X 3' raceway. Each pond can accommodate 6,000 gallons per minute (gpm) of flow. A rotating screen and stoplogs maintain water level and keep fish in the pond.

The upper pond can be divided into two sections by setting a series of screens into slotted channels at the mid-point of the pond. Predator control measures include a bird netting cover. Skookumchuck also has one vinyl pond (8' X 80' X 3'). Flow to this pond is approximately 200 gpm. This pond is not used at this time.

At the South Sound net pen complex there are twenty 28' X 28' X 10', twenty-four 20' X 40' X 10' and four 40' X 40' X 10' net pens.

5.6) Acclimation/release facilities.

Acclimated/released from the saltwater net pens in Peale Pass.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Skookumchuck:

Unknown predator loss can result in pond shortage and inability to meet program goals.

Net Pen Operation:

1. Predators (otter) reduce the release population by an unknown amount and cause stress to fish remaining in pens.

2. Toxic marine organism blooms can cause mortality or stress to coho rearing in the net pens. This condition is dependent on weather patterns conducive to bloom outbreaks. In general this does not happen very often.

3. Disease pathogens such as Bacterial Kidney Disease (BKD) or Vibrio have resulted in early releases due to mortality and inability to treat fish before release. This has occurred infrequently during the life of the program and is considered an exception rather than the norm.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Skookumchuck:

NA

Net Pens:

Tribal staff are available on an as-needed basis to respond to emergencies at the pens. During a marine organism bloom fish are monitored for stress signs and not fed if bloom is causing mortality. If mortality is high, fish may be released early to allow them to seek water clear of the bloom. It is unknown if this action would result in adverse effects on listed stocks in the area. It is important to note that out of 30 years of operation fish have not been released due to algae bloom only.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

The broodstock returning to the Wallace River trap. At times Minter Creek stock has also been used. The current program is evolving and for the 2001 brood year (release in 2003), the adults returning to Minter Creek and Wallace River may be used.

6.2) Supporting information.

6.2.1) History.

The historical source for broodstock has been Skykomish-May Creek coho returning to the Wallace River trap. At times Minter Creek stock has also been used. The current program is evolving and for the 2001 brood year, the stocks to be used may be Minter Creek and Wallace River.

6.2.2) Annual size.

Number of adults needed is a portion of the adults collected at the Minter Creek and Wallace River hatcheries.

6.2.3) Past and proposed level of natural fish in broodstock.

Unknown (The '95 and '96 brood years at Minter Creek and Wallace River, respectively, were mass marked. So, all returning adults collected beginning in 1998 were of hatchery-origin).

6.2.4) Genetic or ecological differences.

None known

6.2.5) Reasons for choosing.

More local stock

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

NA

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults

7.2) Collection or sampling design.

No collection of broodstock at these facilities. Refer to Minter Creek and Wallace River coho HGMP's.

7.3) Identity.

All coho used for broodstock will/have been 100% identified with a adipose-fin clip.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

No broodstock collected at this facility (Number of adults needed is a portion of the adults collected at the Minter Creek and Wallace River hatcheries).

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available: NA

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					

Data source:

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7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

NA

7.6) Fish transportation and holding methods.

NA

7.7) Describe fish health maintenance and sanitation procedures applied.

NA

7.8) Disposition of carcasses.

NA

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

NA

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

NA

8.2) Males.

NA

8.3) Fertilization.

NA

8.4) Cryopreserved gametes.

NA

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

NA

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. “egg to smolt survival”) that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

NA (refer to the Minter Creek and Wallace River coho HGMP's).

9.1.2) Cause for, and disposition of surplus egg takes.

NA

9.1.3) Loading densities applied during incubation.

NA

9.1.4) Incubation conditions.

NA

9.1.5) Ponding.

NA

9.1.6) Fish health maintenance and monitoring.

NA

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

NA

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

Year	Life Stage	Fish In	Fish Planted
1988	Fingerling to Smolt	2,348,878	3,968,550*
1989	Fingerling to Smolt	2,500,500	2,451,000
1990	Fingerling to Smolt	2,776,455	2,613,490
1991	Fingerling to Smolt	2,102,787	2,005,250
1992	Fingerling to Smolt	2,208,690	2,930,059
1993	Fingerling to Smolt	2,388,975	2,271,600
1994	Fingerling to Smolt	2,340,539	2,210,325
1995	Fingerling to Smolt	2,202,050	2,160,025
1996	Fingerling to Smolt	2,346,000	2,287,292
1997	Fingerling to Smolt	2,617,000	2,512,400
1998	Fingerling to Smolt	2,671,600	2,500,200
1999	Fingerling to Smolt	2,015,000	1,983,755
2000	Fingerling to Smolt	2,284,700	2,270,700

* Please note: entries showing more fish planted than received most likely reflect some direct plants into Peale Passage from the receiving stations. This would not be reflected in "fish in" since "fish in" only account for fish that were transferred to the net pens raised and released.

9.2.2) Density and loading criteria (goals and actual levels).

Our goal is to raise fish to 10 fish per pound (fpp) at release. The maximum densities,

given this size fish, fish per pen and pen size, is 0.56 lbs/cubic feet in the 20' X 40 X 10' pens and 0.57 lbs/cubic feet in the 28' X 28 X 10' pens. Release size for these fish have historically ranged from 13 to 10 fpp. Density limits have not been exceeded.

9.2.3) Fish rearing conditions

Salinity ranges from 28 to 31 parts per million (ppm).

Temperatures range from 44 to 55 degrees Fahrenheit.

Tidal influence occurs twice daily.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Monthly Growth Rates

Month	FPP	Length	C-Factor
Jan	22	115.7	4.41
Feb	20	121.7	4.50
March	17	126.4	4.63
April	14	132.7	4.86
May	10	158.1	3.94
June	9	163.5	4.01

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not available.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Food type used: dry salmon diets were used for this program:

Daily application: hand fed, six days per week.

Feed rate and range: 1.0 to 1.5% B. W./day

Feed conversions: average feed conversions for most recent 3 years is 0.95 to 1.0

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Fish are checked as needed to identify fish health problems.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

NA

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

NA

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

NA

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	1,800,000	10	May/June	Peale Pass

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Peale Pass
Release point: Peale Pass
Major watershed: South Puget Sound
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

*For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in **Attachment 2**. Cite the data source for this information.*

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995							2,160,025	13
1996							2,287,292	12
1997							2,512,400	11
1998							2,506,680	10
1999							1,983,775	11
2000							2,270,700	12
2001							1,343,573	12
Average							2,152,064	12

Data source: South Sound NP hatchery records

Note: From 1988 to 1993 experimental release strategies were tried. Some fish were held for two years for release as "Jumbo" fish as these were thought to contribute to sport fisheries in South Puget Sound. Since 1994 the program has been 100% devoted to program size of 10 fpp releases in May and June.

10.4) Actual dates of release and description of release protocols.

Year of Release	Number	Size (fpp)	Date(Month and Day)
1995	181,600	13.3	5-3
	600,025	12.6	6-1 thru 6-6
	613,400	14.8	6-6 thru 6-7
	467,000	12.6	6-23 thru 6-30
	298,000	14.8	6-24
1996	219,000	12.7	5-15
	214,000	12.3	5-16
	973,772	12.8	5-21 thru 5-30
	830,620	11.6	6-1 thru 6-12
	49,900	30.0	2(fish escaped)
1997	1,181,500	11.6	5-14 thru 5-28
	480,000	11.01	5-14 thru 5-28
	850,900	10.4	5-03 thru 5-06
1998	533,480	11.3	5-12 thru 5-21
	258,000	11	5-12 thru 5-21
	474,020	9.2	6-2 thru 6-4
	1,252,180	9.9	6-9 thru 6-11
1999	982,500	12.1	5-11 thru 5-13
	589,600	11.5	5-13 thru 5-18
	411,675	11.9	5-19
2000	2,270,700	12	5-15 thru 5-19

Fish are released by lowering the net edges into the water. Fish are forced from the net pen as the pen is rolled up onto the railing.

10.5) Fish transportation procedures, if applicable.

Fish are transported by truck in January from Skookumchuck to Latimers Landing. Travel time is 1.5 hours. At Latimers, fish are transferred through approximately 100' of 5" irrigation pipe into chemtanks aboard a barge. It takes 45 minutes to travel to the net

pens. Tank 1 is 275 cubic feet with a capacity of 2,668 gallons. Tank 2 is 353 cubic feet with a capacity of 2,648 gallons.

Loading densities are 5.5 pounds per cubic feet of tank space.

Oxygen tanks are used to maintain appropriate dissolved oxygen (DO) levels.

10.6) Acclimation procedures (*methods applied and length of time*).

At Skookumchuck, 50 pounds of salt is added for the haul to Latimer's Landing. The water from the trucks are used to fill the Chemtanks and saltwater is added. A brief acclimation period occurs between transfer and ponding.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

An index group of 50,000 coded-wire tags are applied each year to the pen fish. The remaining coho are 100% mass-marked with an adipose-fin clip.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Fish would be released into Peale Passage. Fish excess to the program before transfer to Skookumchuck could be planted into land locked freshwater lakes.

10.9) Fish health certification procedures applied pre-release.

A fish health specialists inspects the population for pathogens before release and gives the okay to release.

10.10) Emergency release procedures in response to flooding or water system failure.

Emergency release at the net pens would be in response to an oil spill. We have spill response booms on sight.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Yearling coho smolts are released from the net pen in May/June to minimize the likelihood for interaction with natural chinook salmon juveniles. Release of fish from

pens directly into marine waters minimizes the likelihood of predation occurring in the freshwater environment.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how “Performance Indicators” listed in Section 1.10 will be monitored. Results of “Performance Indicator” monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet “Performance Standards”.

11.1) Monitoring and evaluation of “Performance Indicators” presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each “Performance Indicator” identified for the program.

The comanagers conduct numerous ongoing monitor programs, including catch, escapement, marking, tagging, and fish health testing. The focus of enhanced monitoring and evaluation programs will be on the risks posed by ecological interactions with listed species. WDFW is proceeding on four tracks:

- 1) An ongoing research program conducted by Duffy et al. (2002) is assessing the nearshore distribution, size structure, and trophic interactions of juvenile salmon, and potential predators and competitors, in northern and southern Puget Sound. Funding is provided through the federal Hatchery Scientific Review Group.
- 2) A three year study of the estuarine and early marine use of Sinclair Inlet by juvenile salmonids is nearing completion. The project has four objectives:
 - a) Assess the spatial and temporal use of littoral habitats by juvenile chinook throughout the time these fish are available in the inlet;
 - b) Assess the use of offshore (i.e., non-littoral) habitats by juvenile chinook;
 - c) Determine how long cohorts of juvenile chinook salmon are present in Sinclair inlet;
 - d) Examine the trophic ecology of juvenile chinook in Sinclair Inlet. This will consist of evaluating the diets of wild chinook salmon and some of their potential predators and competitors.

Funding is provided by the USDD-Navy.

- 3) WDFW is developing the design for a research project to assess the risks of predation on listed species by coho salmon and steelhead released from artificial production programs. Questions which this project will address include:
 - a) How does trucking and the source of fish (within watershed or out of watershed) affect the migration rate of juvenile steelhead?
 - b) How many juvenile chinook salmon of natural origin do coho salmon and

steelhead consume?

c) What is the rate of residualism of steelhead in Puget Sound rivers?

Funding needs have not yet been quantified, but would likely be met through a combination of federal and state sources.

4) WDFW is assisting the Hatchery Scientific Review Group in the development of a template for a regional monitoring plan. The template will provide an integrated assessment of hatchery and wild populations.

As part of evaluating straying from the pens to South Sound coho tributaries, stream surveys will begin in the fall of 2003. Also, part of an on-going evaluation study to evaluate benefits and risks of using Wallace River stock versus a within region stock (Minter Creek), fish released in 2002 (2000 BY) were coded-wire tagged/adipose fin clipped.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

See Section 11.1.1.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Risk aversion measures will be developed in conjunction with the monitoring and evaluation plans.

SECTION 12. RESEARCH

*Provide the following information for any research programs conducted in **direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish.** If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in **Table 1.***

12.1) Objective or purpose.

There is currently no research being conducted using South Sound Net Pen Coho.

12.2) Cooperating and funding agencies.

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- 12.3) Principle investigator or project supervisor and staff.**
- 12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**
- 12.5) Techniques: include capture methods, drugs, samples collected, tags applied.**
- 12.6) Dates or time period in which research activity occurs.**
- 12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.**
- 12.8) Expected type and effects of take and potential for injury or mortality.**
- 12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).**
- 12.10) Alternative methods to achieve project objectives.**
- 12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**
- 12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

SECTION 13. ATTACHMENTS AND CITATIONS

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

“I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Hatchery Operations				
Location of hatchery activity: Peale Pass (S.S Net Pens) Dates of activity: January-June Hatchery program operator: WDFW				
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown		
Other Take (specify) h)				

- Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- Take associated with weir or trapping operations where listed fish are captured and transported for release.
- Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- Listed fish removed from the wild and collected for use as broodstock.
- Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- Other takes not identified above as a category.

Instructions:

- An entry for a fish to be taken should be in the take category that describes the greatest impact.*
- Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
- If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

* See Minter Creek and Wallace River coho HGMP "take" tables for adults.

